

CLAIMS

What is claimed is.

- 1 1. A process comprising:
2 first forming an imprinted first polymer disposed upon a substrate under
3 conditions to increase the glass transition temperature (T_G) of the first polymer; and
4 subsequently thermal curing an imprinted subsequent polymer disposed over
5 the first polymer.
- 1 2. The process of claim 1, before subsequently thermal curing, the process
2 further including:
3 subsequently thermal imprinting the subsequent polymer, under conditions
4 to increase the T_G of the second polymer.
- 1 3. The process of claim 1, wherein subsequently thermal curing includes a
2 single thermal cure, selected from microwave radiation, infrared radiation, and
3 convection.
- 1 4. The process of claim 1, wherein first forming an imprinted first polymer
2 exposes a portion of the substrate.
- 1 5. The process of claim 1, wherein first forming an imprinted first polymer
2 exposes a portion of the substrate to form a first topology, further including:
3 forming a first metallization within a recess in the first topology.
- 1 6. The process of claim 1, wherein subsequently thermal curing is carried out
2 under conditions to heat the subsequent polymer at a greater rate than the substrate.

1 7. The process of claim 1, further including:
2 first imprinting the first polymer to form a first topology, wherein first
3 imprinting exposes a portion of the substrate; and
4 subsequently imprinting the subsequent polymer to form a second topology,
5 wherein the second topology exposes a portion of the first polymer.

1 8. The process of claim 1, further including:
2 first imprinting the first polymer to form a first topology, wherein first
3 imprinting exposes a portion of the substrate;
4 forming a first metallization within a recess in the first topology;
5 subsequently thermal imprinting the subsequent polymer to form a second
6 topology, under conditions to increase the T_G of the second polymer, wherein the
7 second topology exposes a portion of the first polymer; and
8 forming a subsequent metallization within a recess in the subsequent
9 topology.

1 9. The process of claim 1, wherein the substrate includes an upper surface and
2 a lower surface, wherein the first polymer is disposed upon the upper surface,
3 wherein the first polymer includes a cured polymer upper first film, wherein the
4 second polymer includes a cured polymer upper second film, and upon the lower
5 surface, the process further including:
6 first thermal curing a lower first polymer under conditions to heat the lower
7 first polymer at greater rate than the substrate; and
8 subsequently thermal curing an imprinted subsequent lower polymer
9 disposed over the lower first polymer.

1 10. The process of claim 1, wherein the first polymer is formed over the
2 substrate by depositing a prepolymer selected from a resin, a cyanate ester, a
3 polyimide, a polybenzoxazole, a polybenzimidazole, a polybenzothiazole, and
4 combinations thereof.

1 11. The process of claim 1, wherein the cured polymer first film includes a film-
2 to-substrate thickness ratio selected from about one-tenth, one-eighth, one-fifth,
3 one-fourth, one-third, and one-half the thickness of the substrate.

1 12. The process of claim 1, wherein the first polymer is formed over the
2 substrate by depositing a prepolymer selected from a resin, a cyanate ester, a
3 polyimide, a polybenzoxazole, a polybenzimidazole, a polybenzothiazole, and
4 combinations thereof, and wherein the cured polymer first film includes a film-to-
5 substrate thickness ratio selected from about one-tenth, one-eighth, one-fifth, one-
6 fourth, one-third, and one-half the thickness of the substrate.

1 13. The process of claim 1, further including:
2 *in situ* testing the substrate while attached as part of an array of substrates.

1 14. A process comprising:
2 first forming an imprinted first polymer disposed upon a substrate under
3 conditions to increase the glass transition temperature (T_G) of the first polymer;
4 second forming an imprinted second polymer upon the imprinted first
5 polymer to form a second topology including a second recess; and
6 subsequently thermal curing the imprinted subsequent polymer disposed
7 over the first polymer, wherein subsequently thermal curing forms a cured polymer
8 upper first film from the imprinted first polymer and a cured polymer upper second
9 film from the imprinted second polymer.

1 15. The process of claim 14, before second forming, further including:
2 forming a first conductive material in the first recess; and
3 forming a second conductive material in the second recess.

1 16. The process of claim 14, further including:
2 forming a first conductive material in the first recess, wherein forming a first
3 conductive material is selected from blanket depositing and electroless plating; and
4 after second curing
5 forming a second conductive material in the second recess, wherein forming
6 a second conductive material is selected from blanket depositing and electroless
7 plating.

1 17. The process of claim 14, wherein the first polymer is formed over the
2 substrate by depositing a prepolymer selected from a resin, a cyanate ester, a
3 polyimide, a polybenzoxazole, a polybenzimidazole, a polybenzothiazole, and
4 combinations thereof.

1 18. The process of claim 14, wherein the cured polymer first film is in a film-to-
2 substrate thickness ratio selected from about one-tenth, one-eighth, one-fifth, one-
3 fourth, one-third, and one-half the thickness of the substrate.

1 19. The process of claim 14, wherein the first polymer is formed over the
2 substrate by depositing a prepolymer selected from a resin, a cyanate ester, a
3 polyimide, a polybenzoxazole, a polybenzimidazole, a polybenzothiazole, and
4 combinations thereof, and wherein the cured polymer first film is in a film-to-
5 substrate thickness ratio selected from about one-tenth, one-eighth, one-fifth, one-
6 fourth, one-third, and one-half the thickness of the substrate.

1 20. The process of claim 14, wherein subsequently thermal curing is carried out
2 under conditions to heat the first polymer at greater rate than the substrate.

1 21. A method comprising:
2 assembling a die to a mounting substrate, wherein the mounting substrate
3 includes:

4 a first thermally imprinted cured polymer first film disposed upon a
5 substrate; and
6 a subsequently thermally imprinted cured polymer subsequent film
7 disposed over the first cured polymer first film.

1 22. The method of claim 21, wherein assembling a die to a mounting substrate is
2 selected from assembling a processor to a mother board, assembling a processor to a
3 mezzanine board, assembling a processor to an expansion card, assembling a
4 memory chip to a board, assembling a digital signal processor to a board,
5 assembling a micro-controller to a board, assembling an application specific
6 integrated circuit to a board, and combinations thereof.

1 23. The method of claim 21, wherein the cured polymer first film includes a first
2 topology that exposes a portion of the substrate, wherein a first metallization is
3 disposed within a recess in the first topology; wherein the cured polymer second
4 film includes a second topology, wherein a subsequent metallization is disposed
5 within a recess in the subsequent topology, the method further including:
6 forming an electrical bump in contact with the subsequent metallization; and
7 coupling the electrical bump with the die.

1 24. The method of claim 21, wherein the first thermally imprinted polymer
2 is imprinted under conditions to increase the glass transition temperature
3 (T_G) of the first polymer, and wherein the subsequently thermally
4 imprinted polymer is imprinted under conditions to increase the T_G of the
5 subsequent polymer.

1 25. An intermediate system comprising:
2 a substrate at a substrate temperature;
3 a cured polymer first film at a first glass transition temperature (T_G); and
4 an intermediate polymer second film at a second T_G , wherein the cured

5 polymer second film is disposed above and on at least a portion of the
6 cured polymer first film, and wherein the second T_G is less than the first T_G .

1 26. The intermediate system of claim 25, wherein the cured polymer first
2 film is selected from a resin, a cyanate ester, a polyimide, a
3 polybenzoxazole, a polybenzimidazole, a polybenzothiazole, and
4 combinations thereof.

1 27. The intermediate system of claim 25, wherein the cured polymer first
2 film is in a film-to-substrate thickness ratio selected from about
3 one-tenth, one-eighth, one-fifth, one-fourth, one-third, and one-half
4 the thickness of the substrate.

1 28. A structure comprising:
2 a substrate;
3 a cured polymer first film disposed above the substrate, wherein the cured
4 polymer first film exhibits a first topology, and a minimum feature within the first
5 topology, and wherein the minimum feature exhibits a deviation from planarity of
6 10 percent or less; and
7 a cured polymer second film disposed above and on the cured polymer
8 first film, wherein the cured polymer second film exhibits a second topology.

1 29. The structure of claim 28 further including:
2 an electronic device electrically coupled to the structure.

1 30. The structure of claim 28, further including:
2 an electronic device electrically coupled to the structure, wherein the
3 structure is disposed in one of a computer, a wireless communicator, a
4 hand-held device, an automobile, a locomotive, an aircraft, a watercraft, and a
5 spacecraft.